Overview of Glyphosate Research for Managing Invasive Cattail to Disperse Blackbird Roosts

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Introduction

Beginning in 1991, USDA’s Wildlife Services (WS) began aerially spraying cattail-dominated wetlands with glyphosate herbicide to reduce sunflower damage by blackbirds. The techniques used by WS were developed by scientists over 20 years of research that included types of spray patterns, percent basin coverage, environmental impacts, and glyphosate concentrations and volumes. As the cattail management program enters its 20th year, we review published research that was used to support scientific needs of the management program.

Background

Hybrid cattail is the dominant emergent vegetation in many wetlands in North Dakota and South Dakota. Ripening crops, especially sunflower, planted near cattail-dominated wetlands can sustain considerable economic damage from blackbirds during late summer and fall. Growers can obtain assistance at no cost from WS. Several management techniques are available. However, cattail management has been one of the most effective. Wetlands near sunflower fields are sprayed with glyphosate herbicide in late summer. The herbicide eliminates cattails destroying the birds’ roosting and loafing habitat.

Research began on the use of glyphosate to manage dense cattail stands in the mid 1970’s. Most of the research on ways to reduce blackbird damage using glyphosate was conducted by scientists at the National Wildlife Research Center’s North Dakota field station. It began in 1989 with a focus on efficacy and environmental safety. In this poster, selected studies are displayed in a time line, and we briefly describe their importance to the cattail management program.
Time Line

1970 - 74
- Hybrid cattail invaded wetlands in the Dakotas in the 1950's and became the most dominant large hydrophyte in the 1970's (Kantrud 1992)
- Glyphosate herbicide registered in 1974

1975 - 79
- Lower concentrations of glyphosate as effective as higher concentrations on emergent vegetation, including cattail (Mueller & Lembi 1975, Lembi 1978)

1980 - 84
- Increased abundance of invertebrates and increased use by waterfowl in glyphosate-treated wetlands (Murkin & Kadlec 1986)
- Different concentrations of glyphosate comparable across different application dates (Comes & Kelly 1989)

1985 - 89
- Glyphosate practically non-toxic to midge larvae (Buhl & Faerber 1989)
- Increased abundance of invertebrates and increased use by waterfowl similar to results of Murkin & Kadlec (Solberg & Higgins 1993)
- Various application rates, volumes, and dates tested with similar results to study by Comes & Kelly (Messersmith et al. 1992)
- Efficacy tests of glyphosate concentrations with similar results as previous studies; reduced use by some bird species in treated wetlands (Linz et al. 1992)

1990 - 94
- GIS techniques developed for analyzing short- and long-term effects of glyphosate on wetland vegetation (Homan et al. 1992)
- Invertebrate species not affected by tank mixtures of glyphosate applied to wetlands (Henry et al. 1994, Linz et al. 1999)
- Concentrations of abiotic variables (e.g., phosphates, nitrates, dissolved oxygen) similar between treated and untreated wetlands (Linz et al. 1999)
- Blackbirds discouraged from roosting in glyphosate-treated wetlands; sunflower damage possibly reduced in nearby fields (Linz et al. 1995)
- Numbers of breeding blackbird and marsh wren declined in treated wetlands regardless of various levels of percent glyphosate coverage (Linz et al. 1996a)
- Dabbling and diving ducks numbers increased in treated wetlands (Linz et al. 1996b)
- Numbers of sora rails declined, whereas numbers of coots and black terns increased in treated wetlands (Linz et al. 1994, Linz et al. 1997)
- Behavior of male ring-necked pheasants not impacted by glyphosate treatments of wetlands near pheasant territories (Homan et al. 2003)
- Glyphosate reregistered in 1993

1995 - 99
- Early low-volume applications of glyphosate as effective as early and late high-volume applications (Homan et al. 2005)
- Glyphosate treatments economically effective when roosts concentrations are greater than 238 blackbirds/hectare (Leitch et al. 1997)

2000 - 04
- Patent on glyphosate molecule expired in 2000
- Impact of WS'' cattail management program on loss of cattail minor compared to total cattail coverage in North Dakota (Raison et al. 2007)
Discussion

In 2000, WS updated their cattail management protocol after years of cumulative research on glyphosate efficacy and application methodology. The changes included lowering the spray volume and the application rate to a below-label rate.

A lower spray volume was particularly important to the cattail management program, because it allowed helicopters to compete with fixed-wing aircraft in cost effectiveness. The deployment of helicopters in 2000 caused a chain of protocol alterations that led to a reduction in the minimum basin-size requirement and elimination of drift retardant.

Wildlife groups often disagree on the methods used by agriculture to solve wildlife conflicts. The WS cattail management program, however, appears to meet the environmental needs of wildlife interests as well as the production needs of agriculture. Fragmenting dense cattail stands with glyphosate 1) returns wetlands to their original physiognomies, 2) does not impair numbers of invertebrates, and 3) promotes avian diversity while preventing the formation of large roosting aggregations of blackbirds.

Literature Cited